THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

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1947 FUNGICIDE TESTS:
A SUMMATION OF NATION-WIDE RESULTS WITH NEWER FUNGICIDES

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PLANT DISEASE REPORTER SUPPLEMENT

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station Beltsville, Maryland

1947 FUNGICIDE TESTS: A SUMMATION OF NATION-WIDE RESULTS WITH NEWER FUNGICIDES

Compiled by
The Fungicide Committee of the American Phytopathological Society:
Sub-committee on "Summation of the Performance of Newer Fungicides"[1]

Plant Disease Reporter
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REPORT OF SUB-COMMITTEE ON SUMMATION OF THE PERFORMANCE OF NEWER FUNGICIDES

A widespread and generous response was again received from Federal and State plant pathologists in the United States and Canada to the request of the special committee of the Potomac Division, American Phytopathological Society to secure information on the performance of newer fungicides applied experimentally in different ways to various crops through the 1947 season. Information was received from about 145 professional workers located in 47 States and Provinces. The reports included more than 130 different fungicides used on soils or on some 57 different kinds of plants, seeds, or planting stock.

Thanks are due to all who cooperated and to all who expressed interest and gave encouragement to this effort.

This summary does not in any way represent final conclusions or imply recommendations of any sort. It is necessarily incomplete in scope as it covers only results of experiments in 1947 that were submitted to the committee by cooperators. It has been prepared solely for the information of professional people concerned with plant disease control to give a broad, rough picture of the experimental progress being made.

This digest probably gives a fair indication of the current trend of results with new fungicides and also brings out some of the variations in performance met with by different workers. In many cases it is difficult to explain these variations. Their occurrence, however, points to the existence of important factors influencing the effectiveness or safety of the different materials. These factors must be uncovered and evaluated before the profession can advise growers with assurance how to make best use of these newer materials under different circumstances.

The committee would appreciate constructive criticisms of this report and helpful suggestions that may serve as a guide in the improvement of any future efforts along this line.

LIST OF COOPERATORS

State or Province	Cooperators	Place[2]
ALABAMA	Coyt Wilson	Auburn
	A. L. Smith	Tallassee
ALBERTA (Canada)	L. E. Tyner	Edmonton
ARKANSAS	H. R. Rosen	Fayetteville
	V. H. Young	Fayetteville
CALIFORNIA	C. E. Yarwood	Berkeley
	E. E. Wilson	Davis
	K. F. Baker	Los Angeles
	L. J. Klotz	Riverside
	G. Zentmeyer	Riverside
COLORADO	H. P. H. Johnson	Fort Collins
	W. D. Thomas	Fort Collins
CONNECTICUT	S. Rich	Mt. Carmel
	J. G. Horsfall	New Haven
	P. J. Anderson	Windsor
DELAWARE	S. H. Davis	Bridgeville
	J. W. Heuberger	Bridgeville
	J. C. Dunegan	Dover
	M. C. Goldsworthy	Dover
	R. A. Wilson	Dover
	L. P. Nichols	Newark
FLORIDA	A. A. Foster	Apopka-Sanford
	J. M. Walter	Bradenton
	A. H. Eddins	Hastings
	R. F. Suit	Lake Alfred
	G. K. Parris	Leesburg
	R. R. Kincaid	Quincy
	J. R. Christie	Sanford
	J. C. Russell	Sanford
GEORGIA	B. S. Hawkins	Experiment
	J. G. Gaines	Tifton

[2] In most cases, place where work was done.

State or Province	Cooperators	Place
HAWAII	J. W. Hendrix	Poamoho
	J. A. Lyle	Poamoho
ILLINOIS	J. L. Forsberg	Kankakee
	J. C. Carter	Urbana
	Benjamin Koehler	Urbana
	M. B. Linn	Urbana
	D. Powell	Urbana
INDIANA	R. M. Caldwell	Lafayette
	L. E. Compton	Lafayette
	R. R. Mulvey	Lafayette
	Eric G. Sharvelle	Lafayette
	A. J. Ullstrup	Lafayette
	J. R. Shay	Lake Cicott
IOWA	W. F. Buchholtz	Ames
	D. E. Hardy	Ames
	W. J. Hooker	Ames
	C. S. Reddy	Ames
KANSAS	E. Abmeyer	Doniphan
	E. D. Hansing	Manhattan
	C. L. King	Manhattan
	L. A. Schafer	Manhattan
	W. W. Willis	Manhattan
LOUISIANA	D. C. Neal	Baton Rouge
	E. C. Tims	Baton Rouge
	R. S. Woodward	Calhoun
	J. G. Atkins	Hammond
	A. G. Plakidas	Hammond
MAINE	M. T. Hilborn	Monmouth
MANITOBA (Canada)	J. E. Machacek	Winnipeg
MARYLAND	C. L. Lefebvre	Beltsville
	R. W. Leukel	Beltsville
	W. D. McClellan	Beltsville
	Helen Sherwin	Beltsville
	R. A. Jehle	College Park
	C. E. Cox	Salisbury
	W. F. Jeffers	Salisbury

Place or Province	Cooperators	Places
MASSACHUSETTS	O. C. Boyd	Amherst
	E. F. Guba	Amherst
MICHIGAN	J. H. Muncie	College Farm
	L. H. Person	College Farm
	D. Cation	East Lansing
	J. Vaughan	East Lansing
	W. F. Morofsky	Lake City
	R. Nelson	Parma
MINNESOTA	A. C. Hodson	Rochester
	E. O. Mader	Rochester
	M. B. Moore	St. Paul
MISSISSIPPI	D. C. Bain	Crystal Springs
	C. A. Leonard	State College
	John C. Presley	State College
MISSOURI	H. G. Swartwout	Columbia
NEBRASKA	R. H. Moore	Lincoln
NEW HAMPSHIRE	E. Rasmussen	Durham
	M. C. Richards	Durham
NEW JERSEY	R. B. Wilcox	Pemberton
	B. H. Davis	Smithburg
	R. H. Daines	Vincentown
NEW MEXICO	P. J. Leyendecker	State College
NEW YORK	A. M. French	East Aurora
	A. J. Braun	Geneva
	J. M. Hamilton	Geneva
	A. W. Dimock	Ithaca
	D. H. Palmiter	Poughkeepsie
NORTH CAROLINA	G. B. Lucas	Oxford
	R. S. Cox	Raleigh
	D. E. Ellis	Raleigh
	F. A. Todd	Raleigh
	S. G. Lehman	Rocky Mount
	R. Aycock	Wilkesboro
	C. N. Clayton	Wilkesboro

State or Province	Cooperators	Place
NORTH DAKOTA	W. E. Brentzel	Fargo
	W. G. Hoyman	Grand Forks
NOVA SCOTIA (Canada)	K. A. Harrison	Kentville
	J. F. Hockey	Kentville
OHIO	O. S. Cannon	Bowling Green
	H. F. Winter	Clyde
	H. A. Runnels	Wooster
	J. P. Sleesman	Wooster
	H. C. Young	Wooster
	J. D. Wilson	Wooster
OKLAHOMA	C. F. Grays	Stillwater
	W. R. Kays	Stillwater
	J. H. McLaughlin	Stillwater
	W. W. Ray	Stillwater
	A. J. Vlitos	Stillwater
ONTARIO (Canada)	G. C. Chamberlain	St. Catherines
	J. K. Richardson	St. Catherines
OREGON	P. W. Miller	Corvallis
	J. R. Kienholz	Hood River
PENNSYLVANIA	F. H. Lewis	Arendtsville
	W. S. Beach	State College
	W. B. Chandler	State College
	H. W. Thurston, Jr.	State College
PRINCE EDWARD ISLAND (Canada)	L. C. Callbeck	Charlottetown
RHODE ISLAND	F. L. Howard	Kingston
	J. B. Rowell	Kingston
SASKATCHEWAN (Canada)	R. C. Russell	Saskatoon
SOUTH CAROLINA	W. M. Epps	Charleston
	C. H. Arndt	Clemson
	Cotton Seed Treatment Committee	Clemson
	T. W. Graham	Florence

State or Province	Cooperators	Place
TENNESSEE	J. M. Epps	Jackson
	C. D. Sherbakoff	Jackson
	D. M. Simpson	Knoxville
TEXAS	L. M. Blank	College Station
	P. A. Young	Jacksonville
	E. W. Lyle	Tyler
UTAH	Gerald Thorne	Salt Lake City
VIRGINIA	A. B. Groves	Winchester
WEST VIRGINIA	F. W. Craig	Charleston
	J. G. Leach	Huttonsville
	W. Yount	Huttonsville
	C. F. Taylor	Kearneysville
WISCONSIN	J. D. Moore	Egg Harbor
WYOMING	W. L. Quayle	Laramie

FUNGICIDES USED DURING 1947[3]

Trade Name	Active Principle	Source
Arasan	Tetramethyl thiuram disulfide	Du Pont
Arasan S. F.	Tetramethyl thiuram disulfide	Du Pont
Barbak C	Phenyl mercuric cyanamide	Amer. Cyanamid & Chem. Corp.
Basicop	Copper basic sulfates	Sherwin-Williams Co.
Benzyl salicylate	Benzyl salicylate	---
Bioquin (Copper 8)	Copper 8-quinolinolate	Monsanto Chem. Co.
Bioquin 1	Copper 8-hydroxyquinolinolate	Monsanto Chem. Co.
Bioquin 100	---	---
Bioquin 850	8-hydroxyquinoline sulfate	Monsanto Chem. Co.
Bismuth subsalicylate	Bismuth subsalicylate	Mallinckrodt Chem. Co.
Bordeaux mixture	Copper basic sulfates	Various
Bordow	Copper magnesium basic sulfates	Dow Chem. Co.
Burgundy mixture	Copper carbonate	Home made
Calcium cyanamid	Calcium cyanamid	Amer. Cyanamid & Chem. Corp.
Calogreen	Mercuric chloride	Mallinckrodt Chem. Co.
Camden paste	Flotation sulfur paste	---
Carbon + carbide	---	---
Ceresan	Ethyl mercuric chloride	Du Pont
Ceresan M	Ethyl mercury p-toluene sulfonanilide	Du Pont
Ceresan, New Improved	Ethyl mercuric phosphate	Du Pont
Ceresan, 2%	---	---
Chromate 169	Chromate complex	Carbide & Carbon Chem. Corp.

[3]The materials are listed under the names used by cooperators. It is realized that in some instances the same preparation is listed under more than one name.

Trade Name	Active Principle	Source
Chromate 519	---	---
Chromate 531	Chromate complex	Carbide & Carbon
Chromate 578	---	---
Chromate 658	Chromate complex	Carbide & Carbon
Chromate 698	Chromate complex	Carbide & Carbon
Compound A	Copper oxychloride	Du Pont
Compound 169	---	---
Compound 308	---	---
Compound 337	Glyoxalidine compound	Carbide & Carbon
Compound 629	---	---
Copotex Dust	Copper-lime-calcium arsenate	Niagara Sprayer & Chem. Co.
Copper A Compound	Copper oxychloride	Du Pont
Copper-8	Copper 8-hydroxyquinolinolate	Monsanto
Copper carbonate	Copper carbonate	Various
Copper oxychloride	Copper oxychloride	Various
C. O. C. S.	Copper oxychloride-sulfate	Harshaw Chem. Co.
Copper tribasic sulfate	Copper tribasic sulfate	Tennessee Copper Co.
Copro-50	Copper oxychloride-sulfate	Los Angeles Chem. Co.
Cupro K	Copper oxychloride	Rohm & Haas
Cuprocide (Yellow)	Cuprous oxide	Rohm & Haas
D-D	Dichloro propene and propane	Shell Chem. Co.
Delmo-Z	Zinc hydroxide stabilized	California Spray Chem. Co.
Dithane D-14	Sodium ethylene bis dithiocarbamate	Rohm & Haas
Dithane Z-78	Zinc ethylene bis dithiocarbamate	Rohm & Haas
Dodge Tribasic	---	---
Dow 5	Chloranil	Dow
Dow 9B	Zinc trichlorophenate	Dow
Dow 289	Dinitro compound	Dow
Dow 296	Dinitro compound	Dow

Trade Name	Active Principle	Source
Dow 606	---	Dow
Dow 612	---	Dow
Dowfume G	Methyl bromide	Dow
Dowfume N	Dichloro propene and propane	Dow
Dowfume W-10	Ethylene dibromide 10%	Dow
Dowfume W-40	Ethylene dibromide 20%	Dow
Dowicide B	Sodium salt of 2,4,5-trichlorophenol	Dow
Dowicide G	Sodium pentachlorophenate	Dow
Dry lime sulfur	Calcium polysulfides	Sherwin-Williams
Du Pont 1451 GGG	Ethyl mercury p-toluene sulfoanilide	Du Pont
Du Pont 1452 F	Ethyl mercury p-toluene sulfoanilide	Du Pont
Elgetol	Sodium dinitro cresolate	Standard Agr. Chem. Co.
Everett Paste	By-product sulfur	---
Fermate	Ferric dimethyl dithiocarbamate	Du Pont
Fermate Rose Dust	Ferric dimethyl dithiocarbamate + sulfur	Du Pont
Flotation sulfur paste	By-product sulfur	Various
Formaldehyde	Formaldehyde	Various
Fruit thinner III	Zinc dimethyl dithiocarbamate cyclohexylamine complex	B. F. Goodrich Chem. Co.
Fungorex	Copper aluminum complex	Westwell Chem. Co.
Glyoxalidine A, dry	Heptadecyl imidazoline	Carbide & Carbon
Glyoxalidine B, dry	Heptadecyl imidazoline	Carbide & Carbon
Glyoxalidine C, paste	Heptadecyl imidazoline	Carbide & Carbon
Glyoxalidine HCl	---	---
Glyoxalidine 337, paste	Hydroxyethyl heptadecyl imidazoline	Carbide & Carbon
Glyoxalidine 341	---	---
Glyoxalidine 341B	---	---
Good Rite p.e.p.s.	Polyethylene polysulfides	Goodrich
H.E. 178	Zinc ethylene bis dithiocarbamate	Rohm & Haas
Hytox Sulfur	Wettable sulfur	Miller Chem. & Fert. Co.

Trade Name	Active Principle	Source
Iscobrome	Methyl bromide	Innis-Speiden & Co.
Iscobrome D	Ethylene dibromide	Innis-Speiden
Iscobrome No. 1	Methyl bromide	Innis-Speiden
Isothan Q 15	Lauryl isoquinolinium bromide	Onyx Oil & Chem. Co.
Karbam (Black)	Ferric dimethyl dithiocarbamate	Sherwin-Williams
Karbam (White)	Zinc dimethyl dithiocarbamate	Sherwin-Williams
Kolodust	Sulfur dust	Niagara
Kolofog	Bentonite sulfur	Niagara
Kolospray	Wettable sulfur	Niagara
Larvacide	Chloropicrin	Innis-Speiden
Leytosan	Phenyl mercuric urea	F. W. Berk. & Co.
Lime sulfur	Calcium polysulfides	Various
Lunasan	Ethyl mercuric thiourea	Berk
Lysol	50% tar acids (xylenols) + soaps	Lehn & Fink
Magnetic "70" Paste	Wettable sulfur paste	Stauffer Chem. Co.
Manganese ethylene bis dithiocarbamate	Manganese ethylene bis dithiocarbamate	Du Pont
Mercunol	Mercury compound	---
Mercuric chloride	Mercuric chloride	Various
Mersolite A	---	---
Mersolite 8	Phenyl mercuric acetate	Berk
Methasan	Zinc dimethyl dithiocarbamate	Monsanto
Microgel	Tribasic copper sulfate	Tennessee Cooper Co.
Micronized sulfur	Wettable sulfur	Various
Mike Sulfur	Micronized wettable sulfur	Dow
Mulsoid Sulfur	Wettable sulfur	Sherwin-Williams
Mycotox	50%, 2,4,5-trichlorophenylacetate + 50% inert Pyrax	Givaudan Delawana, Inc.
Mycotox 1	---	---
National Research Council Formula	Phenyl mercuric bromide and chloride	Canadian Research Council

Trade Name	Active Principle	Source
Omilite	Polyethylene polysulfides	Goodrich
Parson's Seed Saver Dust	Organic and inorganic mercury combination	Parsons Chem. Works
Parzate	Zinc ethylene bis dithiocarbamate	Du Pont
P.E.P.S.	Polyethylene polysulfide	Goodrich
Perenox	Copper oxychloride	Canadian Industries Ltd.
Phenyl mercuric acetate	Phenyl mercuric acetate	Berk
Phenyl mercuric fixtan	Phenyl mercuric hydroxide + formaldehyde	---
Phygon	Dichloronaphthoquinone	U. S. Rubber Co.
Phygon Rose Dust	Dichloronaphthoquinone + sulfur	U. S. Rubber Co.
P.M.A.S.	Phenyl mercuric acetate	Berk
P.M.A.S.-AA	---	---
Puratized	Phenyl mercuric triethanol ammonium lactate	---
Puratized Agricultural Spray	Phenyl mercury triethanol ammonium lactate	Niagara
Puratized N 5 E	Phenyl mercury triethanol ammonium lactacte	Gallowhur Chem. Corp.
Puratized 177	Phenyl amino cadmium lactate	Gallowhur
Puratized 306	Phenyl mercury formamide	Gallowhur
Puratized 641	Phenyl mercury compound	Gallowhur
Puraturf	Phenyl mercury triethanol ammonium lactate	Niagara
R 118 A	Ethyl mercuric isothiocarbamate	---
R 1078 x 67	---	---
Roccal	Benzyl trialkonium chloride	Winthrop Chem. Co.
Rosin lime sulfur	Calcium polysulfides	Home made
Semesan Jr.	Ethyl mercury phosphate	Du Pont
Silver nitrate-lime	---	---
Spergon	Tetrachlorobenzoquinone	U. S. Rubber Co.
Spergon W	---	
Sulfur	Wettable sulfur	Various
Sulfuron	Wettable sulfur	Du Pont
Tennessee 26	Copper basic sulfates	Tennessee Copper Co.
Tennessee 34	Copper basic sulfates	Tennessee Copper Co.

Trade Name	Active Principle	Source
Tennessee Copper Dust	Copper basic sulfates	Tennessee Copper Co.
Tennessee Tribasic	Copper basic sulfates	Tennessee Copper Co.
Tersan	Tetramethyl thiuram disulfide	Du Pont
Thiourea	Thiourea	Various
Vitron D copper dust	Copper basic sulfates	---
White Diamond No. 63 dust	---	---
Z 78	Zinc ethylene bis dithiocarbamate	Rohm & Haas
Zac	Zinc dimethyl dithiocarbamate-cyclohexylamine	Goodrich
Zerlate	Zinc dimethyl dithiocarbamate	Du Pont
Zinc nitro dithioacetate	Zinc nitro dithioacetate	Kienholz
Zinc sulfate lime	Zinc basic sulfates	Home made
Zinc 8-hydroxyquinolinolate	Zinc 8-hydroxyquinolinolate	---
Zinc 8-quinolinolate	Zinc 8-quinolinolate	Monsanto
629 + 632	Zinc nitrodithioacetate-copper nitro acetate	General Chem. Co.
No. 666	---	---

RESULTS WITH FRUIT DISEASES

APPLES

Reports were received from Delaware, Kansas, Illinois, Indiana, Maine, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, New York, New Hampshire, North Carolina, Nova Scotia, Ohio, Ontario, Pennsylvania, Rhode Island, Virginia, West Virginia, and Wisconsin.

SCAB:

Fermate, Puratized Agricultural Spray, Phygon, Bioquin 1, Glyoxalidine B and C, wettable sulfur, micronized sulfur, flotation sulfur pastes, lime-sulfur, Magnetic "70" sulfur paste, and Mike sulfur were used most frequently in the schedules for comparison. Zerlate, Parzate, Z 78, Glyoxalidine A, dry lime-sulfur, Kolospray, Kolofog, Mulsoid sulfur, Hytox sulfur, Isothan Q 15, manganese ethylene bis dithiocarbamate, phenyl mercuric formamide, and phenyl mercuric acetate were used occasionally.

Combinations of Fermate + sulfur, Puratized + bordeaux, Puratized + Isothan Q 15, Puratized + tribasic copper, Puratized + sulfurs, Fermate + polyethylene polysulfides, and Puratized + lime were occasionally used.

Puratized Agricultural Spray was generally used only in the bloom applications and at calyx, and other materials (usually sulfurs and Fermate) were used for the cover sprays. Since Puratized Agricultural Spray contains mercury, it is doubtful whether it will be used in the cover sprays at any time. Combining the material with Fermate and copper and sulfur compounds at the bloom stage does not appear logical, since all of these materials may cause the specific agent (mercury) to combine in other forms to interfere with its performance.

As to relative fungicidal performance of the various materials, the data submitted in 1947 indicated that of the compounds used most, such as Phygon, Fermate, Puratized Agricultural Spray, Bioquin 1, Glyoxalidines, Flotation sulfurs, wettable sulfurs, and lime-sulfur, Phygon was consistently the best. There was little to choose between the various sulfurs, Puratized Agricultural Spray, and Fermate. The 1947 scab prevalence was generally low and the performance of some of the weaker fungicides was enhanced because of it. The performance of Puratized Agricultural Spray was erratic. In some cases it rated last, and no doubt this reflects its inability to act in a residual manner. In some areas ascospore discharge was relatively late, coming after bloom, and the eradicating effect of this chemical, used in the bloom period, no doubt was lost, due to its being replaced in the cover sprays by weaker materials.

Bioquin 1 (copper 8-hydroxyquinolinolate) was used in eight schedules submitted, and in general its performance was high enough to warrant further tests. Very little injury was observed from this copper compound and this, indeed, was surprising. The Glyoxalidine compounds were used in a few of the tests and for the most part their control performance appeared satisfactory. The B and C compounds appeared to possess the best fungicidal activity. The C compound appeared to be injurious in several tests, causing bronzing and hardening of leaf tissues and russetting of fruits. The Flotation and sulfur pastes all gave very good performances, as did the various micronized sulfurs and lime sulfur, without causing any serious injuries. Phygon, while the most effective of those used as a fungicide (and some considered it as acting like an eradicant), was not particularly favored when it came to injury. Fruit finish of some varieties invariably suffered when this compound was used; occasionally the leaves were found to be mottled and sometimes burned. Dermatitis was frequently suffered by the operators when the material was used. Fermate appeared to be consistently effective in 1947 and very few observers found the material causing any type of injury. Puratized Agricultural Spray appeared to cause a yellowing of the older leaves in some cases. When combined with sulfurs and bordeaux mixture it caused considerable fruit russet, indicating that these are not compatible mixtures. Zinc ethylene bis dithiocarbamate (Parzate and Z-78) was used in two tests without being very effective as a fungicide. Zinc dimethyl dithiocarbamate (Zerlate) was used by one cooperator, but ranked fairly low in control. Isothan Q-15 was used by one operator in combination with sulfur and with Puratized Agricultural Spray, but the results were not satisfactory. Phenyl mercuric acetate was used by one operator with good results. Manganese ethylene bis dithiocarbamate was not outstanding in one test as a fungicide, but it was noted by the observer that no injury developed from its use.

For apple scab, in general, the Flotation sulfur pastes, micronized sulfurs, and lime-sulfur proved to be just as effective as Fermate, Glyoxalidines, and Bioquin 1. Puratized Agricultural Spray proved somewhat better than the above when timed properly with ascospore discharge, and Phygon proved to be the best fungicide of all, but lacking in safety to the trees and to the operators.

RUST:

Virginia reported experiments to control rust on the York variety. In this test Fermate, Phygon, Puratized Agricultural Spray, Glyoxalidine A and B, and Bioquin 1 were compared. Fermate was best, followed closely by Phygon. Puratized and the Glyoxalidines did a very good job, but Bioquin 1 was a distinct failure in controlling the disease through the bloom and first cover. None caused any injury.

BROOKS FRUIT SPOT:

New Jersey reported on the control of fruit spot on Golden Delicious. Bordeaux mixture, Fermate, Tennessee 26, Bioquin 1, zinc 8-hydroxyquinolinolate, Phygon, Glyoxalidine B, and Omilite were compared. The copper materials and Fermate ranked about equal, and were best. Zinc 8-hydroxyquinolinolate, Phygon, Glyoxalidine, and Omilite were distinctly inferior to these, but much better than the untreated. These materials were used 30 to 40 days after the calyx application in two sprays 10 days apart, and at that time bordeaux mixture caused a severe russet. Some slight russeting was evident where Fermate, Tennessee 26, Bioquin 1, Phygon, and Glyoxalidine B were used.

BLOTCH:

Delaware reported one test against this disease on Duchess. Bordeaux mixture, Bioquin 1, Phygon, and Fermate were compared. Fermate proved to be the best material for this disease, followed closely by Bioquin 1. Bordeaux mixture was also very effective, but its phytotoxic qualities reject its use. Phygon was a distinct failure. In Missouri Fermate proved to be better than anything else used to date. Bordeaux mixture, at delayed dormant, curtained initial blotch infections.

BLACK ROT:

Northwestern Greenings were sprayed in Delaware with bordeaux mixture, Parzate, Parzate-Fermate, Zerlate, Parzate-Zerlate, Fermate, Bioquin 1, zinc 8-quinolinolate, and Phygon for black rot control. Leaf spot control was best with bordeaux mixture, but leaf fall from copper injury was severe. Fair control was experienced with all materials except Phygon, which failed to prevent the development of the disease.

PEARS

SCAB: An experiment on this disease was described from Oregon. Fermate, Zerlate, Glyoxalidine 341, Sulfuron, Dithane D-14, and zinc nitro dithioacetate were compared. Fermate, Zerlate, and Glyoxalidine 341 controlled the disease about equally, but 341 caused fruit russet. Dithane D-14, Sulfuron, and zinc nitro dithioacetate were inferior to Fermate and Zerlate and caused appreciable russet to fruit.

CHERRIES

Reports were received from Nebraska, New York, Ohio, Oklahoma, Ontario, Pennsylvania, Virginia, West Virginia, and Wisconsin.

LEAF SPOT:

Fermate, Phygon, Glyoxalidine A, B, C, and HCl, Bioquin 1, Zerlate, zinc 8-hydroxyquinolinolate, bordeaux mixture, copper oxychloride

sulfate ,Tennessee 26, Tennessee Tribasic, lime-sulfur, Cupro K, Bordow, Copper A Compound, Basicop, and Dodge Tribasic were used in the tests.

In general, the best leaf-spot control was secured with the various copper compounds. In some States these materials caused ring spot of the fruit and in some regions leaf bronzing and spotting were evident. Of the various Glyoxalidine materials used, the HCl compound was the best fungicide and the A and B compounds proved to be the safest. Glyoxalidine C proved to be injurious to both fruit and leaves. Fermate and Phygon proved to be suitable for the bloom and preharvest applications if followed by a copper material which served to keep the leaves on the trees until late in the season. Such combinations as this appear to be the most promising; an organic such as Fermate, Phygon, or Glyoxalidine B before harvest and a copper material, no matter which, following harvest. This prevents build-up of objectionable residues before picking and prevents leaf fall following harvest. One operator reported that disking of leaves and trash on the orchard floor during bloom cut infection down to about half of that developing on the untreated plots.

BROWN ROT:

Oregon reported one experiment in which brown rot was the important disease. Phygon, Glyoxalidine C, Zerlate, Fermate, and Sulfuron were compared for control. None of the materials proved to be effective, due to the advent of hail injury, which caused all the fruit to become generally diseased. None were reported as causing any damage to leaves or fruits.

PEACHES

Reports were received from Delaware, Illinois, Michigan, New Jersey, Ohio and Virginia.

BACTERIAL SPOT:

In New Jersey two experiments were reported. Zinc lime, Zerlate, zinc 8-hydroxyquinolinolate, Phygon, Tennessee 26, and sulfurs were used for comparison in the control of the disease. Zinc lime and Tennessee 26 were the most effective materials used, while Phygon, Zerlate, and zinc 8-hydroxyquinolinolate proved inferior. The copper material Tennessee 26 caused some leaf injury. None of the materials used were particularly effective against the leaf phase of the disease.

BROWN ROT:

Reports were received from Delaware, Illinois, Michigan, New Jersey, and Ohio. Phygon, Bioquin 1 and 100, Fermate, Parzate, Zerlate, Fermate, Parzate-Zerlate, Parzate-Fermate, magnetic sulfur paste, liquid lime sulfur, wettable sulfurs, micronized sulfur, and Flotation paste

were used for comparison. In one Delaware test where the blossom phase was treated Phygon appeared the best material to use. In the other tests where the materials were applied to the growing and mature fruit, Phygon was not so effective as sulfur or the dithiocarbamates. Zinc 8-hydroxyquinolinolate appeared not to be very effective. The data submitted, in general, on control of brown rot (fruit phase) were not representative and no real conclusions were possible.

LEAF CURL:

One test was reported from Virginia. Glyoxalidine 337 and 341B, Dithane Z 78, Phygon, Karbam black, Compounds 308 and 629, Puratized Agricultural Spray, and Bioquin 1 were compared. All of the above materials, except 308, 629, and Dithane Z 78, proved satisfactory in controlling the disease.

GRAPES

BLACK ROT:

Reports were received from Florida, Missouri, New Hampshire, New York, and Ohio.

Dithane-zinc lime, Glyoxalidine A, Compound 169, bordeaux mixture, Fermate, Phygon, Methasan, Puratized Agricultural Spray, copper oxychloride-sulfate, Tennessee 26, and Zerlate were used in the experiments.

For black-rot control Fermate proved to be the best material used, provided downy mildew and powdery mildew were absent. Combination sprays of Fermate and Puratized Agricultural Spray and Fermate and Zerlate were not so effective as Fermate alone. Phygon, while effective, was found to cause too much injury. In a few cases the insoluble coppers proved very good. None of the other materials proved as good as the dithiocarbamates, but Zerlate and Methasan caused injury.

DOWNY MILDEW:

One test was reported from Ontario. Fermate, bordeaux mixture, and Basicop were compared. Bordeaux mixture proved to be the best and far superior to Basicop. Fermate proved to be the poorest, but much better than the untreated.

CRANBERRIES

FRUIT ROTS:

One test was reported on from New Jersey. Bordeaux mixture, Dithane D 14 plus zinc-lime, Fermate, Karbam black, and Karbam white were used for comparison.

Karbam white proved to be the best material used, followed by Fermate and Karbam black. Bordeaux mixture and Dithane D-14 plus zinc-lime proved inferior. Fermate in oil did not prove to be satisfactory for the control of the rots. Increasing the dosage of Fermate from 2 pounds to 3 pounds per 100 gallons of spray did not prove effective in increasing the control of the diseases.

CITRUS

MELANOSE:

One test was reported on grapefruit from Florida. Chromate 169 and 53, copper Compound A, bordeaux mixture, manganese ethylene bis dithiocarbamate, zinc ethylene bis dithiocarbamate, and Glyoxalidine A were used for comparison. The chromate 169 compound, copper compound A, and bordeaux mixture proved to be the best and proved to be very effective materials in the control of the disease. The dithiocarbamates were inferior to the above, and the control with Glyoxalidine A was no better than that shown in the untreated plots. None of the materials caused injury to the fruit. Apparently the disease is controlled by copper compounds and not by organic materials.

BROWN ROT, SEPTORIA SPOT, BLAST, AND BOTRYTIS:

One test was reported from California, listing these four diseases. Chromate 519 and 578, Bioquin 1, Copper aluminum iron Fungorex, zinc-copper-lime, bordeaux mixture, Copper aluminum Fungorex, zinc dimethyl dithiocarbamate-cyclohexylamine complex, silver nitrate-lime, Copro 50, Parzate, and manganese ethylene bis dithiocarbamate were used for comparison.

The copper compounds were found to possess the best fungicidal action against all diseases, followed by the silver-lime mixture. The dithiocarbamates proved to be the poorest, and possibly this was due to their poor adhesiveness.

WALNUTS

BACTERIOSIS: Two experiments were reported on from Oregon. In one the material used was sodium pentachlorophenate (Dowicide G) and the application was made at the delayed dormant stage of growth. No control of the disease on subsequent growth was observed.

In the other test the materials were applied to growing tissue. The chemicals used were bordeaux mixture, copper oxychloride-sulfate (C.O.C.S.) Yellow Cuprocide, and Phygon. The best control of the disease occurred when bordeaux mixture was used. The insoluble copper

compounds, while not so effective as bordeaux mixture, were superior because of their lack of injuriousness. Phygon was distinctly inferior to the copper compounds.

PECANS

SCAB: One test was reported on from Oklahoma. Bordeaux mixture, Tennessee Tribasic, and Zerlate were compared for disease control. The bordeaux mixture sprays were applied at different time intervals and spanned the whole schedule. Some plots received two sprays, some three, and one four. The best control was experienced in the Zerlate plots, sprayed throughout the season, followed by the bordeaux plot, receiving the first three applications. The bordeaux plot receiving only the first two applications was the poorest of all the plots in control, and comparable with the plot sprayed with the insoluble copper compound.

AVOCADOS

DOTHIORELLA ROT: One test was reported on from California. Bioquin 1, Parzate, Omilite, Fermate, lime sulfur, and Dithane D-14 were compared in controlling the disease. In one plot Bioquin 1 spray (1-100) was compared with a Dithane D-14 fog (20% solution) and a Bioquin 1 dust (10%). Considerable reduction in the disease followed the use of the Bioquin 1 spray and the Dithane D-14 fog. In another plot Parzate, Omilite, and Fermate sprays were compared with Parzate (15%) dust. Parzate spray was quite effective, but Parzate dust and Fermate spray were not. In plot 3 lime sulfur was not very effective in controlling the disease. Omilite was observed to cause a delayed ripening.

RASPBERRIES

ANTHRACNOSE.

One test was reported on from New York. Lime-sulfur, Elgetol, Dow 289 (dinitro), and Dow 296 (dinitro) were applied at delayed dormant and lime-sulfur was applied as a cover spray also in one plot. The best control of cane lesions followed the use of lime-sulfur in delayed dormant and in the cover spray. The dinitro compounds proved effective, but poorer than lime-sulfur.

LEAF DISEASES.

One test was reported on from Tennessee. A dormant spray of lime-sulfur was used in one plot and compared with three applications of Fermate, as cover sprays, in another plot. Fermate gave excellent results and was much better than lime sulfur, in the dormant spray.

RESULTS WITH VEGETABLE DISEASES

Wherever possible, results have been presented by placing the compounds in groups of approximately equal control or yield. Of the newer compounds used, two were considered by the cooperators not to warrant further testing. No brand-new organic compound was reported. The dithiocarbamates, particularly Parzate and Dithane Z-78, were more widely used than in 1946. Of particular interest was the fact that several cooperators reported on the use of combinations of dithiocarbamates (e.g., Zerlate-Parzate) and of combinations of dithiocarbamates and coppers (e.g., Zerlate-Tribasic, tank-mixed). Another interesting new dithiocarbamate combination was Zac (zinc dimethyl dithiocarbamate-cyclohexylamine). The chromates appeared promising.

POTATOES

NO DISEASE:

NEW HAMPSHIRE: Used Bordeaux, Phygon, Parzate, and C.O.C.S. with DDT. All reduced yields slightly below DDT used alone.

MARYLAND (Pocomoke): DDT alone gave higher yields than Bordeaux + DDT, Dithane Z-78 + DDT, and Calcium Arsenate used alone.

NOVA SCOTIA: Tests for two years, comparing copper and organic compounds, have been barren of results as diseases have not been a factor.

LATE BLIGHT:

Tests were reported from Prince Edward Island, Pennsylvania (2), Connecticut, New York (3), and Maryland.

PRINCE EDWARD ISLAND: Based on control of tuber rot, the preferred materials were Bordeaux 10-5-100 and 10-10-100, Tribasic, and Perenox; Zerlate, Karbam, and Dithane D-14 are not satisfactory.

PENNSYLVANIA (2): Descending order of control was (1) Bordeaux and Dithane D-14; (2) Parzate and Tribasic; (3) Chromate 658 and C.O.C.S.; (4) Zerlate and Phygon. Descending order of yield in one test was (1) Dithane D-14 and Parzate; (2) Chromate 658, Tribasic, C.O.C.S., and Bordeaux; and (3) Zerlate and Phygon (much lower yields). In a second test the order was (1) Chromate 658; (2) Tribasic, C.O.C.S., Dithane D-14, Zerlate, and Bordeaux; and (3) Parzate and Phygon.

In CONNECTICUT, where disease incidence was light, the preferred materials were (1) Dithane D-14 and C.O.C.S.; (2) Bordeaux, and (3) Dithane Z-78 and Phygon; (Zerlate was very poor).

NEW YORK: In two spray tests all materials used gave perfect control of late blight; Parzate and Dithane D-14 gave deeper green foliage than fixed copper compounds (Copper A, Tribasic, C.O.C.S.) and Bordeaux; Parzate outyielded all the copper compounds (Dithane D-14 was second best). Yields of Bordeaux alone and with DDT were not significantly different. In a dust test, descending order of control was (1) Copper A and Tribasic; (2) Cuprocide and Dithane Z-78; and (3) Copper-lime. Copper-lime gave the best yields and Dithane Z-78 the poorest.

In the MARYLAND (Oakland) test, Dithane Z-78 + DDT outyielded Bordeaux + DDT by 127 bu./acre. Late blight was not severe. Maryland also reported that Bordeaux + DDT gave more potatoes than DDT alone, except on early-maturing varieties.

EARLY BLIGHT:

Tests were reported from North Dakota, Ohio, Iowa, Michigan, and Delaware.

In NORTH DAKOTA all materials used gave approximately equal control but descending order of yield was (1) Dithane D-14 and Zerlate (significant over untreated); (2) Parzate and Dithane Z-78; and (3) C.O.C.S., Phygon, zinc sulfate-lime, and Bordeaux. (Notes appended state that copper sprays and dusts are not good for controlling early blight; copper fungicides do not stimulate plants whereas zinc-containing fungicides gave highest yields even when early blight was absent; and C.O.C.S. and Phygon are not worth further testing for early blight control.)

OHIO: Reported descending order of control (1) Chromate 169; (2) Zerlate, Parzate, Dithane D-14 and Tribasic; (3) Bioquin and C.O.C.S.; and (4) Phygon. Yields followed the same order except for Bioquin which was equal to Zerlate. Chromate 169 gave by far the best yield. (Note appended states that alternating schedules of Zerlate with either Parzate or C.O.C.S. were excellent.)

IOWA reported descending control order (1) Parzate and Dithane D-14; (2) Zerlate and Bordeaux; (3) C.O.C.S.; and (4) Phygon. Descending yield order was (1) Parzate and Dithane D-14; and (2) C.O.C.S. and Zerlate. Phygon and Bordeaux reduced yield below untreated.

MICHIGAN reported that no material used was significantly the best as early blight was not severe. Highest yields were obtained from a combination of zinc nitro dithioacetate and copper nitro acetate plus DDT. Comparing Bordeaux, C. O. C. S., Dithane D-14, Parzate, Zerlate and Phygon, all used with DDT, the highest yield was given by Parzate and the next by Dithane D-14.

DELAWARE reported descending order of control (1) Parzate and Bordeaux;

(2) Zerlate-Parzate (1-1 ratio), Dithane Z-78, and Dithane D-14; (3) Copper A and Zerlate; (4) Tribasic, Yellow Cuprocide, C.O.C.S., and Zerlate-Parzate (3-1 ratio); and (5) Phygon. Yield in descending order was (1) Parzate and Zerlate-Parzate (1-1); (2) Zerlate-Parzate (3-1); (3) Dithane D-14 and Copper A; (4) Bordeaux, C.O.C.S., Tribasic, Yellow Cuprocide, Zerlate; and (5) Phygon.

EARLY BLIGHT AND LATE BLIGHT:

Tests were reported from Rhode Island, West Virginia, and Ohio (2).

OHIO reported descending control order, (1) Chromate 169 and Parzate; Dithane D-14 and Zerlate; (3) Tribasic, Bioquin, C.O.C.S., and Phygon. Descending order of yield in one test was (1) Chromate 169; (2) Tribasic; (3) Dithane D-14 and Phygon; (4) Parzate and Zerlate; and (5) C.O.C.S. and Bioquin. In the second test, the order was (1) Parzate and Dithane D-14; (2) Zerlate and Chromate 169; (3) Tribasic and Phygon; and (4) C.O.C.S. (Appended note stated that Zerlate alternating with either Parzate or C.O.C.S., or tank-mixed, gave excellent yields.)

In RHODE ISLAND, late blight was severe from mid-July to mid-August and early blight was severe for the remainder of the season. Under these conditions, the descending control order was (1) Parzate; (2) Bordeaux; (3) Tribasic and Dithane D-14; (4) Phygon; and (5) Zerlate. (Mycotox 1 was no better than untreated.) Bordeaux, Phygon, and Mycotox 1 caused leaf injury. Descending order of yield was (1) Parzate; (2) Tribasic and Dithane D-14; (3) Zerlate and Bordeaux; and (4) Phygon. (Mycotox 1 yielded less than untreated.)

WEST VIRGINIA reported descending control order, (1) Chromates; (2) Bordeaux; (3) Tribasic; (4) Dithane Z-78; (5) Dithane D-14; and (6) Phygon. Order of yield was (1) Chromates; (2) Dithane Z-78; (3) Bordeaux; (4) Tribasic; (5) Dithane D-14; and (6) Phygon. (Appended note stated that Tribasic was the most practical material from all viewpoints, and that certain Chromates and Dithane D-14 were promising.) Bordeaux caused slight injury.

TOMATOES

NO SERIOUS DISEASES:

In tests in Iowa, North Dakota, and South Carolina, disease was not a factor. Under these conditions, no fungicide used increased yields significantly and none decreased yields significantly.

ANTHRACNOSE:

In a spray test in NEW JERSEY, the descending order of control was (1) Zerlate (3 applications) followed by Tribasic (2 applications),

and the Zerlate-Tribasic-Zerlate-Tribasic-Tribasic schedule; (2) Tribasic and Cuprocide; and (3) Dithane Z-78 and Dithane D-14. The yield followed the same order. No injury was observed.

EARLY BLIGHT:

In spray tests in Connecticut, Delaware, Illinois, New Hampshire, and Ohio, the only disease of consequence was early blight. The descending order of control was as follows:

CONNECTICUT: (1) Parzate: (2) Zerlate and Bordeaux; (3) alternating Zerlate and Tribasic, Chromate 169, Tribasic, and Phygon; and (4) Dithane D-14 and Dithane Z-78
ILLINOIS: (1) Zerlate , and alternating Zerlate and Tribasic; (2) Tribasic; (3) Yellow Cuprocide; and (4) Dithane Z-78.
NEW HAMPSHIRE: (1) Phygon; (2) Zerlate-Parzate, and Parzate; (3) Zerlate-Fermate and Manganese ethylene bisdithiocarbamate; and (4) Bordeaux, Copper oxide, and C. O. C. S. were poorer than the checks.
OHIO: (1) Tribasic: (2) Zerlate and Dithane Z-78; and (3) Phygon.
DELAWARE: (1) alternating Zerlate and Tribasic, Bordeaux, Zerlate and Tribasic; (2) Copper A and alternating Parzate and Tribasic; (3) Dithane Z-78 and Parzate; and (4) Phygon.

No yield data were taken in CONNECTICUT. In OHIO, the four materials used were equal in yield. In NEW HAMPSHIRE all materials gave lower yields than the checks, Bordeaux and Parzate being the poorest. In ILLINOIS, the alternating schedule of Zerlate and Tribasic, and Dithane Z-78, gave the highest yields; Zerlate and Tribasic were next best, and Yellow Cuprocide was the same as the checks. In DELAWARE, Parzate and Dithane Z-78 gave the highest yields, followed by Tribasic, alternating Zerlate and Tribasic, and Zerlate.

In ILLINOIS, Phygon was so injurious that the plots were abandoned.

LATE BLIGHT, EARLY BLIGHT, AND ANTHRACNOSE:

In one spray test in Pennsylvania and four in Ohio these three diseases were a factor.

PENNSYLVANIA: The descending order of control was Z-Z-Z-T-T, Dithane Z-78, Phygon, Parzate, Z-T-Z-T-Z, Chromate 169, and Zerlate (Z = Zerlate; T = Tribasic). Phygon caused slight injury. Descending order of yield was (1) Z-Z-Z-T-T; (2) Phygon and Parzate; (3) Dithane Z-78 and Z-T-Z-T-Z; and (4) Zerlate and Chromate 169.

OHIO: Six fungicides were common to all four tests, namely Tribasic, Zerlate, Parzate, Dithane Z-78, Bioquin, and Phygon. WHERE late blight was not serious, Zerlate, Tribasic, and Parzate were the three preferred

materials; WHERE late blight was serious, Parzate, Tribasic, and Dithane Z-78 were the three preferred materials. Bioquin and Phygon were inferior and caused injury. Where used, Chromate 169 gave good control of defoliation, caused some chlorosis, and an intermediate yield response. C. O. C. S. and Copper A were somewhat inferior to Tribasic. A new material, Zac, used in one test gave good control, was slightly injurious to foliage, and gave yields below those of seven other materials in the test. Alternating schedules of Zerlate and Tribasic or Bordeaux, and half-and-half mixtures of Zerlate-Tribasic and Zerlate-Parzate, were reported to be better than most single treatments in some of the tests.

EARLY BLIGHT, LATE BLIGHT, AND GRAY LEAF SPOT:

In a test in HAWAII, these three diseases were serious. The descending order of control was Zerlate, Fermate, Dithane D-14, Tribasic, Yellow Cuprocide, Isothan Q15, and Phygon. The last two materials were very phytotoxic and reduced yields below that of the untreated plants. Zerlate gave best yields, Tribasic was second, and Fermate, Yellow Cuprocide, and Dithane D-14 were next best.

GRAY LEAF SPOT:

In a test at Bradenton, FLORIDA, this disease was severe. Dithane D-14 gave good control, Parzate fair control, and Copper A poor control.

SEPTORIA AND EARLY BLIGHT:

These were the major diseases in tests in Texas, Ontario, and Maryland. In the Ontario and Maryland tests, comparisons were made of various copper and organic fungicides. In both places the copper compounds gave better control of defoliation than the organics (Ed. Note --J.W.H.--presumably because of Septoria). Phygon was reported injurious in Maryland.

In Maryland the descending order of yield of materials statistically better than the untreated was (1) Dithane Z-78; (2) Z-Z-Z-T-T, Copper 8 (Bioquin), and Zerlate; and (3) Bordeaux, Phygon, and Tribasic.

No yields were reported from Canada, but the following remarks were appended: Neutral coppers were best and were all about equal; Dithane D-14 was best of the organics; P.E.P.S. was ineffective.

Maryland appended a note stating that Copper 8 (Bioquin) was very promising.

In Texas, where nailhead rust was also present, Zerlate, Dithane Z-78, and Phygon failed to control it. The fixed coppers (Copper A, Basicop, Tribasic, C.O.C.S. and Spraycop) were all preferred, either as dusts or sprays, because of their control of nailhead rust.

CUCUMBERS

DOWNY MILDEW:

Dust tests were conducted in South Carolina and North Carolina, a combined spray and dust test in Louisiana, and a spray test in Delaware. Materials used most frequently were Zerlate, Fermate, Dithane Z-78, Parzate, Copper A, Tribasic and Bordeaux. Each of the following materials appeared in one test: Tribasic + zinc sulfate, Yellow Cuprocide, Phygon, and Zerlate-Parzate (1-1 ratio).

In NORTH CAROLINA, the copper dusts (Tribasic, Copper A, and Tribasic + zinc sulfate) gave better control and higher yields than the organic dusts (Dithane Z-78, Zerlate, and Fermate). In SOUTH CAROLINA, all materials used gave about equal control but Zerlate gave by far the highest yield; it was noted that Zerlate seemed to stimulate the plants. In LOUISIANA, the copper sprays and dusts, except for Bordeaux, gave poorer control than Parzate, Dithane Z-78, Zerlate, and Fermate sprays and dusts. Dithane Z-78 dust gave the best control, followed by Fermate (sprays) and Bordeaux (spray). No yield data were obtained because of hurricane damage. In DELAWARE, the coppers and the dithiocarbamates gave approximately equal control. The only materials to give a significant increase in yield over the checks were as follows, in descending order: Parzate, Dithane Z-78, Zerlate-Parzate (1-1 ratio), Tribasic, and Zerlate.

All the copper materials, except Tribasic in North Carolina, caused injury, Bordeaux causing the most. Phygon, used in South Carolina, was extremely injurious. The dithiocarbamates were non-injurious except for Fermate, which caused injury in Delaware and North Carolina.

CANTALOUPS

DOWNY MILDEW:

A spray test was conducted in Maryland and a joint spray and dust test in Delaware. Materials common to both tests were Bordeaux, Compound A, Dithane Z-78, Fermate, and Zerlate. Delaware also used Yellow Cuprocide, Parzate, and Dithane D-14. A comparison of similar materials in both tests shows that Bordeaux gave the best control in Maryland whereas the coppers and the dithiocarbamates gave approximately equal control in Delaware.

In MARYLAND, the descending order of yield was Bordeaux, Fermate, Zerlate, Dithane Z-78, and Copper A. In DELAWARE, the order was Fermate, Zerlate, Dithane Z-78, Bordeaux, and Compound A. (Maryland sprayed on a 10-day schedule; Delaware on a 7-day schedule.) Bordeaux and Compound A were injurious in both States; Dithane Z-78 was slightly

injurious in Maryland; and Fermate was injurious in Delaware.

In Delaware, Copper A, Zerlate, Dithane Z-78, and Parzate were compared as sprays and dusts. In each case, the dusts gave poorer disease control but slightly higher yields. Highest yielding treatments were Dithane Z-78 (dust) and Zerlate (dust).

WATERMELONS

DOWNY MILDEW AND ANTHRACNOSE: A dust test was conducted at Leesburg, FLORIDA. The descending order of control against anthracnose was (1) Dithane Z-78, Tribasic, and Copper-Zinc-Lime; (2) Zerlate, Fermate, and Zerlate-Fermate; and (3) Copper A. The order against downy mildew was (1) Dithane Z-78 and Tribasic; (2) Copper-Zinc-Lime; (3) Zerlate; (4) Fermate; (5) Copper A; and (6) Zerlate-Fermate. No yield or injury data were presented.

BUTTERNUT SQUASH

BLACK ROT: In a spray test in MASSACHUSETTS, descending order of control was (1) Zerlate; (2) Parzate and Fermate; (3) Bordeaux and Copper A; and (4) Dithane Z-78. Bordeaux caused injury.

BLOSSOM-END ROT: In the same test as above, the descending order of control, based on number of fruits, was (1) Fermate, Parzate, and Zerlate; (2) Dithane Z-78; and (3) Bordeaux and Copper A.

POWDERY MILDEW: In the same test, Zerlate and Dithane Z-78 failed to control powdery mildew.

LIMA BEANS
(Henderson Bush)

STEM ANTHRACNOSE: One test was conducted in NORTH CAROLINA. Phygon and Fermate were used as sprays. Dusts used were Phygon, Fermate, Zerlate, Tribasic, and Dithane Z-78. Control data showed that both Phygon and Fermate sprays gave excellent control, Phygon being slightly the better of the two. In the dust series, descending order of control was Phygon, Dithane Z-78, Tribasic, Fermate, and Zerlate. Injury was caused only by Phygon and Tribasic. Yield data showed that sprays produced higher yields than dusts. Phygon produced the highest yield, both as a spray and as a dust. In the dust series, the descending order of yield was Phygon, Dithane Z-78, Zerlate, Tribasic, Check, and Fermate.

STRING BEANS

ANTHRACNOSE: In one test in CONNECTICUT descending order of disease control was Phygon, Dithane Z-78, Fermate, and Yellow Cuprocide. Slight chlorosis was caused by Phygon. Highest yield was produced by Fermate, Phygon and Yellow Cuprocide were second, and Dithane Z-78 was last. (Compare this test with that on Henderson Bush lima beans above.)

CELERY

CERCOSPORA BLIGHT:

At St. Catherines, ONTARIO, descending order of control for 14 materials was (1) Bordeaux and Burgundy mixture; (2) Basicop; (3) Copper A and C.O.C.S.; (4) Dithane D-14; (5) Phygon; (6) P.E.P.S. + Basicop, and Mulsoid Sulfur + Basicop; (7) Perenox, Zerlate, and Fermate; (8) Dithane Z-78; and (9) P.E.P.S. No material caused injury. No yield data were given. Preferred materials are (1) Burgundy mixture; (2) Bordeaux; (3) Neutral Coppers; (4) Dithane D-14; (5) other organics.

At Sanford, FLORIDA, descending order of control was (1) Fermate + Zerlate; (2) Fermate, Zerlate, Copper A, Parzate, Bordeaux + Sulfur; (3) C.O.C.S; (4) Tribasic and Phygon; and (5) Dithane Z-78. No injury or yield data were presented.

SPINACH

DOWNY MILDEW:

At Milpitas, CALIFORNIA, descending order of control was (1) Zinc ethylene bis dithiocarbamate; (2) Spergon-Sulfur dust, Bismuth Subsalicylate, Bordeaux + Spreader; (3) Bordeaux + SEC oil, Rosin lime sulfur; and (4) Phygon, Zerlate (dust), Sulfur (dust), and Lime sulfur + zinc sulfate.

Injury was caused by Bordeaux + Spreader, and Phygon.

Descending order of yield was Zinc ethylene bis dithiocarbamate, Sulfur (dust), Spergon-Sulfur (dust), Zerlate (dust), Bismuth Subsalicylate, and Bordeaux + SEC oil. Yield was decreased by Bordeaux + Spreader, Lime sulfur + zinc sulfate, Rosin lime sulfur, and Phygon.

Preferred materials are Zinc ethylene bis dithiocarbamate and Spergon-Sulfur (dust).

BEETS

DOWNY MILDEW: In a test at Milpitas, CALIFORNIA, the same materials were used on beets as on spinach (see data under spinach above). Zinc ethylene bis dithiocarbamate and Spergon-Sulfur (dust) were the best preferred materials.

CABBAGE

DOWNY MILDEW:

At Hastings, FLORIDA, descending order of control was (1) Spergon; (2) Spergon (dust); (3) Phygon (dust); (4) Dithane and Karbam; and (5) Parzate (dust) and Phygon. No injury or yield data were presented.

ALTERNARIA LEAF SPOT:

At Hastings, FLORIDA, descending order of control was (1) Karbam white; (2) Parzate; (3) Fermate; (4) Spergon, Tersan; (5) Tribasic; (6) Copper A and C.O.C.S.; and (7) Cr 1639 (very poor control). Phygon injured seedlings severely. No yield data were presented.

At Apopka, Florida, in a dust test, the descending order of control was (1) Zerlate; (2) Dithane Z-78; (3) Tersan, Fermate, and Spergon; and (4) Sulfur, Fermate, and Phygon. No injury or yield data were presented.

ONIONS

DOWNY MILDEW:

In a combined spray and dust test at Parma, MICHIGAN, the descending order of yields was (1) Dithane Z-78 (dust); (2) Cuprocide-Sulfur (dust); (3) Dithane Z-78; (4) Dow 612; (5) Bordeaux; (6) Lime-sulfur-rosin, P.E.P.S., Wettable Sulfur; and (7) Dow 606 and Cuprocide. Tip-burning was caused by Bordeaux and chlorosis was caused by Cuprocide, P.E.P.S., and Lime-sulfur-rosin. It was noted that P.E.P.S., Wettable Sulfur, Cuprocide, and Bordeaux were not worth further trial. Dusts were more effective than sprays.

At Baton Rouge, LOUISIANA, all materials when used as sprays (Bordeaux, C.O.C.S., Dithane Z-78, Zerlate, and Phygon), failed to give control. In a dusting demonstration, Tennessee Copper Dust A (7% metallic Cu + 2% mineral oil) resulted in 12 percent disease as compared with 45 percent in the check.

USEFULNESS OF SOME OF THE NEWER ORGANIC FUNGICIDES FOR VEGETABLE DISEASE CONTROL

This listing is necessarily incomplete and tentative. It is based entirely on information given in this report on results with vegetable diseases.

BIOQUIN (COPPER-8) may be promising on tomatoes and potatoes. It requires further testing.

CHROMATES (not organic compounds). Some (e.g., 169) look promising on potatoes and possibly on tomatoes.

DITHANE D-14. This material, when used with zinc sulfate-lime, should no longer be considered a new material. Its usefulness on certain crops has been established.

DITHANE Z-78 is promising on potatoes and tomatoes for control of early and late blights; on beans for anthracnose; on celery for Cercospora; on spinach, onions, and beets for downy mildew; on cucurbits for downy mildew and anthracnose; and on cabbage for Alternaria. It is not promising for the control of powdery mildews, nor, possibly, for Septoria on tomatoes.

FERMATE. This is no longer a new material. Its usefulness for the control of anthracnose types of disease has been well established. It is also useful on cucurbits for the control of downy mildew and other diseases. Its limitations for the control of early and late blights on tomatoes and potatoes are well known.

KARBAM (BLACK). See FERMATE above (same active chemical ingredient).

KARBAM (WHITE). See ZERLATE below (same active chemical ingredient).

MANGANESE ETHYLENE BIS DITHIOCARBAMATE appears promising but more widespread tests are required.

PARZATE. See DITHANE Z-78 above (same active chemical ingredient).

P.E.P.S. does not seem promising as a vegetable fungicide.

PHYGON. This material has good disease-controlling powers against many vegetable diseases, but it is often injurious, sometimes seriously so, to many vegetable crops.

SPERGON is good for the control of spinach and cabbage downy mildew, but appears ineffective against most other vegetable diseases.

ZERLATE. This should not be considered new any longer. Its major

weakness appears to be its ineffectiveness against tomato and potato late blight and against powdery mildew diseases. It is excellent for control of early blight of potato and tomato, for cucurbit downy mildew, and for anthracnose diseases. It appears to be a "specific" for rusts.

ZAC. Only one test, on tomatoes, was reported with this material. It should be more widely evaluated in 1948.

NOTE: Several cooperators reported excellent results from the use of combinations of dithiocarbamates, e. g., Zerlate-Parzate, on potatoes, tomatoes, and cucurbits. Tests with such combinations should be extended in 1948.

RESULTS WITH DISEASES OF ORNAMENTAL CROPS INCLUDING SHADE TREES AND TURF

Reports were received from 11 cooperators in 10 States. Included were reports on chrysanthemum, daffodils, gladiolus, rose, snapdragon, twelve shade trees, and turf.

CHRYSANTHEMUM

SEPTORIA LEAF SPOT: Good control was obtained at Ithaca, New York, with Fermate, Bordeaux, Parzate, and Phygon. Lime-sulfur caused severe, and Phygon moderate, injury. Bordeaux-sprayed plants were slightly dwarfed. Growth was slightly better in Fermate- than in Parzate-sprayed plots.

DAFFODIL

FUSARIUM BASAL ROT: At Beltsville, Maryland, control was in the following descending order: Mersolite 8, New Improved Ceresan, Arasan, 2% Ceresan, Puratized Agricultural Spray, Copper 8, Thiourea, Dowicide B, Roccal, and 341. Flower injury was obtained with New Improved Ceresan, 2% Ceresan, Dowicide B, Copper 8, and 341. Bulb yields were best with Arasan, New Improved Ceresan, and Mersolite 8.

GLADIOLUS

Fifteen materials were included in tests in Illinois and Kansas for the control of Fusarium yellows and Fusarium brown rot.

FUSARIUM YELLOWS:

Control obtained in Illinois was in the following descending order: New Improved Ceresan, DuPont 1452-F, DuPont 1451-GGG, Arasan, Dow 9B, Lysol, Mercurnol, Puratized 177, Puratized Agricultural Spray, 8-hydroxyquinoline sulfate, Bismuth subsalicylate, and Mercuric chloride. In overall preference New Improved Ceresan was rated first, followed by DuPont 1451-GGG (Ceresan M), Lysol, Arasan dust, and Dow 9B. Mercuric chloride caused a dry core rot, smaller corms, and extreme reduction in cormel production. Mercurnol, though less severe, caused the same types of injury.

Of three materials tested in Kansas, New Improved Ceresan was considered best, followed by Fermate and Dithane D-14.

FUSARIUM BROWN ROT:

In two tests in Illinois, New Improved Ceresan gave best control, followed by Lysol. Dow 9B, Arasan, and Arasan S. F. were third. Fair control was obtained with DuPont 1451-GGG and 1452-F and Mercunol in one test. Control was poor with Puratized Agricultural Spray, Mercuric chloride, 8-hydroxyquinoline sulfate, Bismuth subsalicylate, Puratized 177, and Calogreen. Plants treated with Mercuric chloride or Calogreen were weaker and more spindly. The overall preference was in the following descending order: New Improved Ceresan, Lysol, Arasan dust, Ceresan M, and Dow 9B.

ROSE

BLACKSPOT:

No significant difference in control was obtained in Arkansas with Phygon Rose Dust, Fermate Rose Dust, or Sulfur dust, but all were much better than untreated. The Phygon Rose Dust caused some foliage injury.

In Texas each of the following combination dusts gave about the same blackspot control as measured by increased weight per plant:--Sulfur:Tennessee Copper 34 (90:10); Tennessee Copper 34:Pyrax:Oil (10:90 + 2% oil); Tennessee Copper 34:Dresinate XXX:Sulfur (10:5:85); and Tennessee Copper 34:Sulfur:Flour (10:70:20). Sulfur:Dithane Z-78 (95:5) was not so effective, and 5% Phygon caused skin irritation and was discontinued.

SNAPDRAGON

RUST:

Parzate, Fermate, Wettable sulfur, Rosin-lime-sulfur, and Bordeaux were compared in California, Ohio, and New York. Best control was obtained with Parzate, followed by Rosin-lime-sulfur, Fermate, and Wettable sulfur, in that order. Bordeaux was not effective where the inoculum potential was high. Parzate was non-injurious; Fermate caused slight dwarfing; Bordeaux caused slight marginal leaf injury as did Wettable sulfur; Rosin-lime-sulfur caused severe injury in New York and Ohio where the humidity was high but did not cause injury in California where the humidity was low. In California the addition of DuPont Spreader-Sticker did not improve the effectiveness of Parzate, but reduced the residue. Also, an increase in the concentration of Parzate did not increase control but resulted in slight marginal leaf discoloration.

ANTHRACNOSE (Colletotrichum antirrhini):

Parzate, Fermate, Bordeaux, Lime-sulfur, and Wettable sulfur all controlled anthracnose in New York. Parzate was rated best because of its dual value for anthracnose and rust.

SHADE TREES

AUSTRIAN PINE

TIP BLIGHT (Sphaeropsis ellisii): In Pennsylvania trees sprayed with Bordeaux, Zerlate, Fermate, Parzate, or Puratized were not injured. Control results were too variable to permit conclusions.

BLACK WALNUT

MARSSONINA LEAF SPOT: In Illinois Puratized Agricultural Spray has been the most effective of 13 fungicides tested during the past five years. In 1947 the average number of spots per leaf and the percentage defoliation was much less on trees sprayed with this material than on trees sprayed with Bordeaux + Soybean flour, Fruit Thinner III, 169, 531, or with Puratized 177.

DOGWOOD

TWIG BLIGHT (Myxosporium sp.): In Pennsylvania Puratized delayed fall-coloration, but none of the materials tested -- Bordeaux, Zerlate, Fermate, Parzate, or Puratized -- gave conclusive disease control.

ENGLISH HAWTHORN

LEAF BLIGHT (Entomosporium thuemenii): In Pennsylvania Bordeaux caused roughened and necrotic spotted leaves and petioles, although it prevented defoliation by the disease. Puratized did not injure the foliage and prevented defoliation early in the season but by October the trees were completely defoliated.

HICKORY

LEAF SPOT (Gnomonia ovata): Zerlate, Parzate, and Puratized gave complete or almost complete control, whereas Fermate gave practically no control, in Pennsylvania. None of the materials injured the foliage.

HORSECHESTNUT

LEAF BLOTCH (Guignardia aesculi): Zerlate and Parzate gave good control, Bordeaux fair control, and Fermate and Puratized poor control, in Pennsylvania. Bordeaux caused slight foliage and petiole injury.

JUNIPER

QUINCE RUST (Gymnosporangium clavipes): No control or injury was obtained with Puratized in Pennsylvania.

NORWAY MAPLE

ANTHRACNOSE (Gloeosporium apocryptum): Fermate gave moderate control in mid-summer, but by fall sprayed trees had as much disease as the unsprayed, in Delaware.

RED OAK

TWIG BLIGHT (Sphaeropsis sp.). Control was obtained with Puratized and with Bordeaux in Pennsylvania. Bordeaux caused a roughening, crinkling, and necrosis of the foliage.

SASSAFRAS

ANTHRACNOSE (Gloeosporium fructigenum): Fermate gave good control with no injury in Delaware.

SOUR GUM

TWIG BLIGHT (Phomopsis sp. ?): Bordeaux and Puratized gave fair control in Pennsylvania, whereas Fermate, Zerlate, and Parzate did not. However, both Bordeaux and Puratized caused foliage injury.

SYCAMORE

ANTHRACNOSE: In Illinois Puratized Agricultural Spray gave good, Puratized 177 fair, and Good-rite p.e.p.s. poor, control. None of these materials injured the foliage. Of 8 materials tested during the past three years, Puratized Agricultural Spray has been the most effective.

BENT TURF

DOLLAR SPOT, COPPER SPOT, AND PINK PATCH:

In Rhode Island P-177 (Puratized 177?), P-641, PMAS, PMAS-AA, CC 531, and Puraturf gave good control of Dollar Spot, whereas Spergon W, Mersolite A, and Dithane Z-78 did not. Pink Patch was controlled with P-177, P-641, and CC 531, but not with Mersolite A or with Dithane Z-78. Some control was obtained with PMAS, PMAS-AA, Puraturf, and Spergon W. Control of Copper Spot was obtained with Puraturf, and PMAS, and fair control with P-177, P-641, and with PMAS-AA. Mersolite A, PMAS, PMAS-AA, and P-641 all caused slight burning but none of the other materials caused injury.

RESULTS WITH PLANT BED DISEASES

TOBACCO

BLUE MOLD: Results were reported from Florida, Georgia, South Caroline, North Carolina and Maryland. Dithane Z-78 and Parzate gave as good blue mold control as Fermate, and at slightly lower concentrations. Both as a spray and a dust Dithane and Parzate were effective at about 3/4 the Fermate rate. Successful blue mold control was obtained in Georgia with a combination of 1 lb. Fermate, 4 oz. salicylic acid, 1 oz. Vatsol-K or Dreft, 100 gallons of water. This mixture is being prepared commercially and sold as Dimole.

CABBAGE

DOWNY MILDEW: Tests in Mississippi showed that wettable Spergon as a spray (4 lb/100 gal) and a dust (6 and 10%) gave satisfactory control. Considering effectiveness of control and freedom from plant injury the 6% dust was preferred.

RESULTS WITH SOIL STERILIZATION AND FUMIGATION

TOBACCO

ROOT KNOT AND MEADOW NEMATODE: Tests were conducted in Florida with shade tobacco. Iscobrome D, Dowfume W-10 (30 gallons per acre), D-D and Dowfume N (20 g.p.a.) were applied 2 1/2 months before transplanting. All gave marked nematode control. The treatments increased the yields of cured leaf 200-250 lbs. per acre and had no unfavorable effect on quality. A large acreage of shade tobacco in north Florida was treated commercially this year. In Connecticut tests were also conducted with shade tobacco. Various treatments with Iscobrome, Dowfume W-40 and D-D all gave effective root knot control.

In Georgia, South Carolina and North Carolina similar experiments were conducted with flue-cured tobacco. The North Carolina tests showed good nematode control with Dowfume W-40 (20 g.p.a.) and D-D (200 lbs p.a.). Yields of cured leaf were increased 325 to 400 lbs. per acre, but the cured tobacco from the treated plots was lower in quality. In Georgia Dowfume W-10 (30 and 40 g.p.a.) and D-D (15 and 20 g.p.a.) were compared. All treatments greatly reduced the amount of root knot but at the rates used, D-D appeared to be slightly the more effective. The very best control was obtained in a series of plots that received rain about 12 hours after treatment. Average yield increases were about 600 lbs. of cured leaf per acre and quality was not affected. Root knot infection developed rapidly in the treated plots after harvest, so the treatments would provide little or no residual protection.

The land used for the tests in both Georgia and North Carolina was very heavily infested so the conditions were more severe than those on the average farm. A large scale experiment in South Carolina yielded entirely negative results. At this location the soil was very dry at the time of treatment, and drought conditions continued for some weeks.

COTTON

ROOT KNOT - MEADOW NEMATODE - FUSARIUM WILT: Tests in Alabama with Dowfume W-10 at rates of 12.5 and 37.5 g.p.a. 10 days before planting, showed effective control of both nematodes and wilt. Marked increases in yield were secured.

SUGAR BEETS

ROOT KNOT AND SUGAR BEET NEMATODE: Large scale field experiments were conducted in Colorado, Wyoming and Nebraska. Applications were made 10-14 days before planting at the rate of 25 g.p.a. In 6 out of 7 tests D-D gave yield increases ranging from 3 to 10 tons per acre. In 7 out of 11 tests Dowfume N gave yield increases - ranging from 3 to 13 tons per acre. In 3 out of 3 tests with Dowfume W-40 increased

yields from 4 to 10 tons per acre. Results with chisel and plow sole applications were equally good.

SUGAR BEET NEMATODE: About 700 acres of land were fumigated for nematode control in the Intermountain area in 1947. The standard application was D-D and Dowfume N 25 g.p.a. Control was satisfactory, but protection was for one year only.

VEGETABLE CROPS

TOMATO, OKRA AND BEANS

ROOT KNOT: Tests in North Carolina with D-D, ethylene chlorobromide, Dowfume W-10 Isobrome D and Uramon applied 17-32 days before planting showed effective root knot control with all treatments. Greatly increased yields of tomatoes were obtained. All treatments except Uramon increased okra yields. Bean yields were reduced by the treatments. Tests with tomatoes and beans at another location using the same materials showed effective root knot control, except with the lowest rate of D-D (200 lbs. p.a.). Again tomato yields were greatly increased in the treated plots, but the bean yields were poor.

CARROT AND BEAN

ROOT KNOT: Florida reported on treatments applied 1 to 20 days before sowing seed. Dowfume W-40, D-D and Cyanamid were used. Dowfume W-40 gave perfect root knot control at 17.5 and 15 g.p.a. and was less effective at 12.5 g.p.a. D-D gave good control at 25 and 20 g.p.a. and was less effective at 15 g.p.a. Cyanamid at 500 and 1500 pounds per acre gave poor control.

LETTUCE

ROOT KNOT: Tests in Florida with Larvacide, Dowfume W-10, D-D and Iscobrome No. 1, applied 3 weeks before seed sowing, all showed partial root knot control. Larvacide (28 g.p.a.) was the most effective and Iscobrome No. I (45 g.p.a.) least effective.

POTATOES (Irish)

ROOT KNOT: Tests conducted in Idaho showed excellent control - less than 10 percent of tubers infected - with Orthofume, Dowfume N, D-D and Dowfume W-10. Untreated checks were 77 to 85 percent infected.

ORNAMENTALS

ROSE

ROOT KNOT: Experiments were conducted in Maryland with Larvacide

(23 g.p.a.), D-D and Dowfume W-15 (both 40 g.p.a.) applied in May. A clean crop of chrysanthemums was produced in the fall. Next year rose seedlings were grown and all treatments gave excellent root knot control.

PANSY

SEEDLING DECAY: Soil was fumigated for 7 days in tight boxes and then aerated in shallow flats for 5 days before sowing pansy seed. Treatments were Larvacide DD and allyl bromide 5 cc per cubic foot, Dowfume W-15 10 cc and Iscobrome No. 1 15 cc. Larvacide and D-D increased germination 96 and 57 percent. Dowfume W-15 and Iscobrome No. 1 had little effect. Allyl bromide inhibited germination completely.

RESULTS WITH SEED TREATMENTS

Requests for summarized information on the performance of seed treatment materials were sent to 55 investigators in 30 States and 4 Canadian Provinces. Reports were received from 27 cooperating groups or individuals located in 18 States and 3 Provinces. Fifteen proprietary fungicides and 9 experimental materials were reported as having been tested on one or more of 16 crops.

Thirteen materials were tried on wheat, 12 on barley, 11 on flax, 6 each on corn, soybeans, and peas, 5 each on cotton, oats, and peanuts, 4 on beans, 3 each on alfalfa and tomatoes and 1 on sweetpotatoes.

With the exception of the reports on cotton, the number of reports received on the different crops was not sufficient to form a basis for adequately evaluating the relative efficiency of the materials used on seed of these crops.

COTTON

ANTHRACNOSE, DAMPING-OFF AND RELATED DISEASES:

Reports were received on cooperative experiments conducted in 21 locations in 10 States. The materials used were Ceresan M (dust and slurry), Dow 9B, separately and in combination with Zerlate or Fermate, and Mycotox. These materials were applied at several different rates to fuzzy, reginned and delinted seed lots. Ceresan M seemed to be best for treating fuzzy and reginned seed as it generally resulted in slightly better stands. The slurry method of applying Ceresan M seemed to have no special merit except that it reduced the poisoning hazard. Dow 9B and Mycotox gave comparable results. Combining Zerlate or Fermate with Dow 9B did not increase its effectiveness.

Throughout the experiments no fungicide was consistently better than the others and few differences were significant and large enough to be reflected in increased yields. Therefore, the fungicidal superiority of any one of these chemicals for all kinds of cotton seed and under all kinds of field conditions has not been demonstrated.

BARLEY

COVERED SMUT: In Saskatchewan, with 20 percent infection in the check, covered smut was eliminated by N. I. Ceresan, Leytosan, and Lunasan at 1/2 oz. per bushel and N. I. Ceresan dip (1 to 800 for 5 minutes); smut was reduced to less than 0.5 percent by Ceresan M (1/2 oz.), Phygon (2 oz.), and formaldehyde dip (1:320 for 5 min.).

OATS

HELMINTHOSPORIUM VICTORIAE:

In Kansas, N. I. Ceresan increased yields about 2 bushels per acre in both resistant and susceptible varieties. In Illinois the stand in Vicland oats was 95.1, 77.1, and 70.7 for N. I. Ceresan, Parsons Seed Saver, and check, respectively. The corresponding percentages of diseased plants were 7.6, 39.6, and 70.7, respectively. In Indiana the percentage increases in stand for Ceresan M dust, Ceresan M slurry, N. I. Ceresan, and Parsons Seed Saver were 29.5, 27, 18.9, and 10.2, respectively. The corresponding percentage increases in yield were 17.7, 14.1, 5.9, and -2.5, respectively. In another test the corresponding percentage increases in yield were 55, 66, 73, and 13, respectively.

COVERED SMUT:

In Washington, in a series of experiments, infection was reduced to less than 0.6 percent by N. I. Ceresan and Ceresan M. Spergon allowed 12 to 29 percent, Parsons Seed Saver 25 to 37 percent, while the checks ranged from 10 to 32 percent.

WHEAT

BUNT CONTROL AND STAND:

In Michigan, N. I. Ceresan (1/2 oz.) reduced bunt to 2.3 percent (38.8 percent in the check), while Parsons Seed Saver allowed 19.2 percent bunt. In Washington, N. I. Ceresan, Ceresan M, and Spergon, controlled bunt satisfactorily, while Parsons Seed Saver averaged 71 percent, with an average of 80 percent in the checks.

In Manitoba the stand from Helminthosporium-infected seed was increased appreciably by N. I. Ceresan, Lunasan, phenyl mercury acetate, and Leytosan. In Kansas the stand from untreated seed was 65.4 percent as compared with Ceresan M 75, Arasan 74.4, N. I. Ceresan 73.8, copper carbonate 70.5, and Spergon 68.9 percent. In North Dakota, N. I. Ceresan increased the stand significantly while Parsons Seed Saver and Dow 9B did not.

SORGHUM

SEEDLING BLIGHT AND KERNEL SMUTS: At Beltsville, Maryland, Arasan (2 oz.), N. I. Ceresan, Ceresan M, Spergon, and Phygon, greatly improved emergence and furnished excellent control of covered kernel smut. Dow 9B, Fermate, Zerlate, Dithane-10, sulfur, and Parsons Seed Saver, were inferior.

CORN

SEED DECAY AND SEEDLING BLIGHTS: Reports were received from Iowa, Indiana, and Michigan. In general, Arasan either as dust or slurry, excelled in improving stands. Phygon, Spergon, Barbak C, and Semesan Jr. were slightly less beneficial. The slurry method of applying dusts to corn is increasing in popularity.

FLAX

IMPROVING STANDS: In North Dakota stands were increased 23.6 percent by N. I. Ceresan (1/2 oz.) but decreased 20 percent by Parsons Seed Saver (1/2 oz.) and 31 percent by Dow 9B (3 oz.). In Manitoba emergence from seed treated with N. I. Ceresan (1-1/2 oz.), Leytosan 1/2 oz., Ceresan M 1/2 oz., and Lunasan (2 oz.) was 57.7, 48.6, 48.2, and 45.6 percent, respectively, as compared with 29.6 percent from untreated seed. The general recommendation in the United States and Canada is N. I. Ceresan at 1-1/2 oz. per bushel.

OTHER CROPS

One report from Alabama on PEANUT seed treatment recommended Ceresan M at 1.5 oz. and Spergon, Arasan, Phygon, and Dow 9B at 3 oz. per 100 lbs. One report from Oklahoma recommended Phygon, Arasan, and Dow 9B for ALFALFA seed. The fungicides did not injure bacterial inoculum but enhanced nodulation. In North Carolina, Arasan (dust or slurry) was superior to Spergon for improving emergence in SOYBEANS. Arasan, especially in slurry form, was found superior also at Beltsville, Maryland, while Phygon, although promoting emergence, injured seedling development. In North Dakota, Spergon increased the yield of STRING BEANS 90 percent. In Oklahoma, Dow 9B, Phygon, Arasan, and Spergon used on MUNG BEANS varied in results according to the dosage used. At high dosages, Dow 9B and Phygon were injurious. One report from Michigan showed little benefit to emergence from CUCUMBER seed after treatment with Spergon, Phygon, Dow 9B, or Arasan. These same materials improved emergence in PEAS only slightly. Better results with peas were reported from Pennsylvania from the use of "Carbon and Carbide", Tribasic copper sulfate, and Arasan. One report from Maryland recommended Puratized 1-5000 as a dip for SWEETPOTATO sprouts to control scurf and Fusarium wilt.

USEFULNESS OF SOME OF THE NEWER ORGANIC FUNGICIDES FOR SEED TREATMENTS

ARASAN: For treating seeds of corn, flax, forage crops, peanuts, sorghum, sugar beets, most vegetables, and alfalfa

DOW 9B: For seed of cotton, corn, beans, peanuts, and possibly some vegetables.

CERESAN M (Du Pont F-1452): For treating seed of barley, oats, wheat, flax, possibly corn and sorghum.

PURATIZED: Sweetpotato sprouts.

PHYGON: For seed of cereals, sugar beets, vegetables, and other seeds. It is injurious to soybeans and mung beans and some other seeds at heavier dosages.

MYCOTOX: For cotton seed

LEYTOSAN: For barley, oats, wheat.

PARSONS SEED SAVER DUST has proved generally inferior to other materials recommended.